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Original Research

Evaluation of Thyroid Nodules: Clinical Perspectives and Diagnostic Approaches

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ABSTRACT:

Background: and Aim: Thyroid swellings are a common clinical presentation in endocrine practice, ranging from benign conditions such as colloid goitre to malignant thyroid tumors. Understanding the prevalence, age and sex distribution, and diagnostic patterns of thyroid disorders is crucial for effective management, especially in developing countries like India. **Material and Methods:** A prospective clinical study was conducted at a tertiary care hospital in India. A total of 100 patients presenting with thyroid swellings were enrolled. All patients underwent detailed clinical examination, thyroid function tests, ultrasonography, and fine-needle aspiration cytology (FNAC). Data on age, sex, ultrasonographic findings, FNAC reports, and provisional diagnoses were collected and analyzed using descriptive statistics. **Results:** The majority of patients were female, with the highest number of cases seen in the 30–50-year age group. Ultrasonography identified colloid nodules (46%) and multinodular goitre (26%) as the most frequent findings. FNAC revealed colloid goitre (48%) as the predominant diagnosis, followed by colloid nodule and thyroiditis. Malignant cases, including papillary thyroid carcinoma and Hürthle cell carcinoma, accounted for a smaller but significant proportion. Bilateral and symmetrical thyroid involvement was common, and female preponderance was observed across most diagnostic categories. **Conclusion:** Benign thyroid disorders, particularly colloid goitre and multinodular goitre, are the most common causes of thyroid swellings in this region. There is a strong female predominance and peak incidence in middle-aged adults. Routine use of ultrasonography and FNAC plays a critical role in accurate diagnosis and management. Early detection of malignant lesions is essential to improve patient outcomes and reduce morbidity.

Keywords: Thyroid swellings, colloid goitre, multinodular goitre, ultrasonography, fine-needle aspiration cytology, thyroid malignancy

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INTRODUCTION

Thyroid swellings are among the most common endocrine-related clinical presentations worldwide, particularly in regions with iodine deficiency and limited access to healthcare. The thyroid gland plays a critical role in metabolic regulation, and its disorders can significantly impact growth, development, and general health. Patients presenting with thyroid swellings may have a range of underlying pathologies, including benign conditions such as colloid goiter, thyroiditis, and hyperplastic nodules, or malignant disorders like papillary and follicular thyroid carcinoma [1,2].

Globally, the prevalence of thyroid disorders varies widely, influenced by geographic, dietary, genetic, and environmental factors. Iodine deficiency remains a major cause of thyroid enlargement in developing countries, while autoimmune thyroiditis and nodular disease are more common in iodine-sufficient areas [3,4]. In India, despite national iodine supplementation programs, thyroid disorders continue to be highly prevalent, particularly among women, contributing significantly to the burden of noncommunicable diseases [5].

Age and sex distribution show a clear female predominance, with thyroid swellings occurring most frequently in the third to fifth decades of life. Hormonal fluctuations, autoimmune predisposition, and genetic susceptibility are believed to contribute to this gender disparity [6,7]. Evaluating the clinical profile, demographic patterns, and pathological spectrum of thyroid swellings is essential for early diagnosis, risk stratification, and management, especially in resource-limited settings where access to

advanced imaging and fine-needle aspiration cytology (FNAC) may be limited [8].

Previous studies have emphasized the importance of clinical examination, ultrasound, and FNAC in distinguishing benign from malignant thyroid swellings, reducing unnecessary surgeries, and guiding appropriate intervention [9]. However, regional data remain sparse, particularly in many parts of India, where the distribution and profile of thyroid disorders may vary due to environmental, dietary, and healthcare access differences [10].

This study aims to determine the prevalence and patterns of various thyroid disorders among patients presenting with thyroid swellings at a tertiary care hospital in India, with particular attention to age and sex distribution and the relative frequency of benign and malignant conditions. Understanding these epidemiological patterns will aid in tailoring diagnostic, therapeutic, and preventive strategies in the local population.

MATERIAL AND METHODS

This prospective clinical study was conducted at the Department of Surgery, a tertiary care hospital in India, over a period of 12 months. The study included 100 consecutive patients who presented with thyroid swellings to the outpatient and inpatient departments during the study period.

Ethical clearance was obtained from the institutional ethics committee prior to the commencement of the study. Written informed consent was obtained from all participants.

Inclusion criteria were patients aged ≥15 years with clinically detectable thyroid swellings, irrespective of sex, who provided informed consent to participate in the study.

Exclusion criteria included patients with recurrent thyroid swellings following previous thyroid surgery, those already diagnosed and under treatment for thyroid malignancies, and patients unwilling to undergo evaluation or surgery.

All patients underwent a detailed history and clinical examination, including assessment of duration of swelling, symptoms of hypo- or hyperthyroidism, pressure effects, and associated systemic complaints. General examination and local neck examination were performed to assess the size, consistency, mobility, and any cervical lymphadenopathy.

Investigations

Routine hematological and biochemical investigations were carried out. Thyroid function tests (T3, T4, TSH) were done to classify functional status. All patients underwent ultrasound neck to evaluate the thyroid gland and cervical lymph nodes. Fine-needle aspiration cytology (FNAC) was performed in all cases to assess the cytological nature of the swelling.

Patients requiring surgical intervention were operated on, and the surgical specimens were sent for histopathological examination to obtain a definitive diagnosis.

Data analysis

Data were recorded on patient age, sex, type of thyroid disorder, FNAC findings, and final histopathological results. The frequency and distribution of various thyroid disorders, age and sex patterns, and prevalence of benign versus malignant lesions were analyzed using descriptive statistics (mean, percentage, frequency).

RESULTS

Table 1 summarizes the ultrasonographic findings among 100 patients with thyroid swellings. The most common diagnosis was colloid nodule (46 cases), followed by multinodular goiter (MNG) with 26 cases. Malignant lesions like thyroid malignancy accounted for 10 cases, and inflammatory conditions like thyroiditis were seen in 10 patients. Less frequent findings included thyroid cysts and thyroglossal cysts, each reported in four patients. Female predominance was observed across most categories, especially in colloid nodules and thyroiditis.

Table 2 presents the fine-needle aspiration cytology (FNAC) results. Colloid goitre was the most frequent finding (48 cases), followed by colloid nodule (14 cases) and colloid cyst (8 cases). Thyroiditis was reported in 10 patients, with Hashimoto's thyroiditis and lymphocytic thyroiditis making up a small fraction. Malignant cases such as papillary thyroid carcinoma and Hürthle cell carcinoma were identified in 4 and 2 patients, respectively. Benign and atypical follicular lesions were also reported. Again, female patients were more commonly affected across most diagnostic categories.

Figure 1 illustrates the distribution of patients based on provisional diagnosis, using a soft color-coded bar chart. The most frequent provisional diagnosis was MNG, followed by colloid nodules and physiological goitre. Females showed a clear dominance across almost all diagnostic groups, reflecting the well-known female preponderance in thyroid diseases. Rare conditions like Hürthle cell carcinoma, follicular carcinoma, and lymphocytic thyroiditis appeared with nearly equal sex distribution or slight male predominance. This visual presentation helps highlight not only the frequency but also the gender trends associated with each diagnosis.

Table 1: Ultrasonographic findings.

Ultrasonographic Findings	No. of Patients	Male	Female
Colloid nodule	46	14	32
Multinodular goiter (MNG)	26	2	24
Thyroid malignancy	10	5	5

Thyroiditis	10	1	9
Thyroid cyst	4	2	2
Thyroglossal cyst	4	2	2
Total	100	26	74

Table 2: FNAC findings.

FNAC Findings	No. of Patients	Female	Male
Colloid goitre	48	38	10
Colloid nodule	14	12	2
Colloid cyst	8	6	2
Thyroglossal cyst	4	2	2
Thyroiditis	10	9	1
Hashimoto's thyroiditis	2	2	0
Lymphocytic thyroiditis	2	2	0
Papillary thyroid carcinoma	4	2	2
Hürthle cell carcinoma	2	1	1
Hyperplastic thyroid nodule	2	1	1
Benign follicular thyroid nodule	2	1	1
Follicular lesion/atypia of undetermined significance	2	1	1
Total	100	77	23

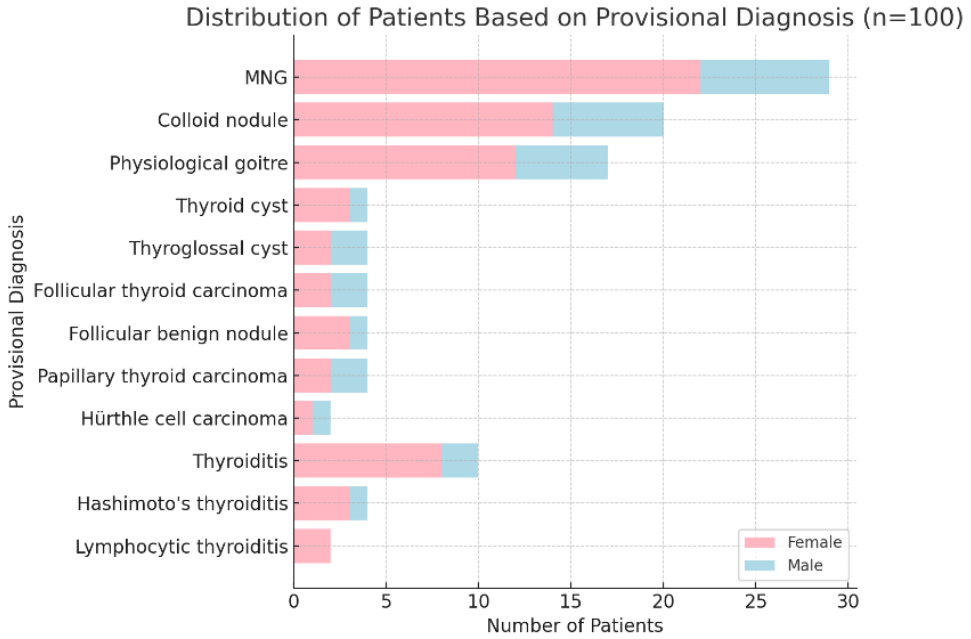

Figure 1: Distribution of patients based on provisional diagnosis.

DISCUSSION

This clinical study provides valuable insights into the spectrum of thyroid swellings encountered in a tertiary care hospital in India. The majority of patients were diagnosed with benign conditions such as colloid goitre, multinodular goitre (MNG), and colloid nodules, which aligns with the epidemiological trends reported in other regional and international studies [11,12]. The high prevalence of benign nodular thyroid disease is often attributed to iodine deficiency, hormonal influences, and genetic predisposition, particularly in South Asian populations.

Female preponderance was a consistent finding across ultrasonographic, FNAC, and provisional diagnoses, reaffirming that thyroid disorders disproportionately affect women. Estrogen receptor expression, autoimmune susceptibility, and hormonal fluctuations have been proposed as possible mechanisms for this gender disparity [13]. Age distribution data indicated a predominance of cases in the third to fifth decades, reflecting the peak period of hormonal activity and metabolic demand when thyroid disorders often manifest clinically.

Malignant lesions, though less common (e.g., papillary thyroid carcinoma, Hürthle cell carcinoma), were not negligible in this cohort. This finding highlights the importance of thorough evaluation, as early detection of malignancy can significantly improve prognosis [14]. Fine-needle aspiration cytology (FNAC) played a critical role in

distinguishing benign from malignant lesions and guiding surgical decisions, underscoring its status as a frontline diagnostic tool in thyroid nodule assessment.
Interestingly, inflammatory thyroid conditions like thyroiditis, Hashimoto's thyroiditis, and lymphocytic thyroiditis were identified, particularly among female patients. Autoimmune thyroiditis has become increasingly prevalent in iodine-replete regions, supporting the shift in thyroid disease patterns as iodine supplementation programs improve population-level iodine status [15].
The integration of ultrasonography, FNAC, and clinical examination allowed for comprehensive patient evaluation in this study. These methods ensured accurate diagnosis, minimized unnecessary surgeries, and improved patient outcomes. However, ongoing awareness, early detection programs, and targeted management strategies are needed, especially in rural and underserved populations where access to specialized endocrine care is limited.

CONCLUSION

This study highlights the predominance of benign thyroid disorders, particularly colloid goitre and multinodular goitre, in patients presenting with thyroid swellings at a tertiary care hospital. A clear female preponderance and peak occurrence in middle age were noted. Although malignant thyroid lesions were less frequent, their presence emphasizes the importance of early detection and cytological assessment. Routine use of ultrasonography and FNAC, along with clinical judgment, remains essential for accurate diagnosis, risk stratification, and effective management of thyroid swellings.

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